

### The Signal Service observer at Sebastian, Fla., reports:

At 12.30 a. m. of the 23d instant, while returning from a repair trip thirty miles south of station, a beautiful meteor of more than ordinary brilliancy was seen. It appeared to be about one-fourth the size of the moon. Appearing in the western horizon, about forty-five degrees from the zenith, it moved in a northerly direction first parallel with the earth then describing part of an elliptical curve, was dissipated apparently within twenty-five degrees of the horizon on a line running north and south, traversing about ninety degrees of space. The meteor was sufficiently large to cast a shadow upon the cabin of the boat; following it was a train of dazzling light, apparently some twenty feet in length, which lasted six or eight seconds. The color at first was a bright red changing to orange. The smoky cloud which was subsequently formed finally disappeared in a perpendicular direction, or at right angles to the primitive line of the meteor. The night was cloudless, with a very light southerly wind. This meteor was so luminous that it attracted the attention of persons whose backs were turned to it. It was by far the most brilliant of the numerous meteors observed by me on previous occasions.

Meteors were also observed as follows: 1st, 3d and 6th, Duke, Fla. 8th, Auburn, Ala.; Kalamazoo, Mich.; Utica, N. Y., and Clebourne, Tex. 9th, Provincetown, Mass., and Stateburg, S. C. 10th, Washington, D. C.; Baltimore, Md., and McMinnville, Oregon. 12th, Lava, N. Mex. 13th, Beverly

and Clayton, N. J. 15th, Kalamazoo, Mich. 17th, Pittsburg, Pa. 19th, Egg Harbor City, N. J.; Stateburg, S. C. 20th, Utica, N. Y. 22d, Fort McDermit, Nev.; Albany, Oregon. 23d, Cairo, Ill. 25th, Cairo, Ill.; Elk Falls, Kans. 26th, Cleburne, Tex. 27th, Humphrey, N. Y. 29th, Beloxi, Miss.

### MIRAGE.

Moorhead, Minn.: a very distinct and well-defined mirage, showing villages, streams, railways, lakes, and distant hills, was observed in nearly all directions, especially in the south-east, during almost the entire day on the 1st. A similar phenomena was also observed in the southeast at 3 p. m. on the 27th. Mirage was also observed at Webster, Dak., on the 1st, 2d, 6th, 10th to 14th, 17th, 25th, 27th, 28th, 30th, and at Traverse City, Mich., on the 2d.

### SAND STORMS.

Fresno, Cal., 2d, 3d, 6th, 11th, 16th, 19th, 24th, 26th, 27th. Yuma, Ariz., 3d, 17th. Fort Sully, Dak., 4th. Willcox, Ariz., 6th, 7th, 18th, 28th. Whipple Barracks, Ariz., 17th to 19th. Fort Bowie, Ariz., 18th.

## VERIFICATIONS.

### INDICATIONS FOR 33 HOURS IN ADVANCE.

The percentages of verifications of the tri-daily indications for June, 1888, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for all districts east of the Rocky Mountains for June, 1888, were made by Professor Cleveland Abbe, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Junior Professor O. F. Marvin.

Percentages of indications verified, June, 1888.

States.		States.	
Maine.....	67.70	Kentucky.....	79.03
New Hampshire.....	63.50	Ohio.....	79.13
Vermont.....	63.93	West Virginia.....	80.87
Massachusetts.....	67.07	Indiana.....	76.27
Rhode Island.....	68.43	Illinois.....	78.57
Connecticut.....	72.00	Lower Michigan.....	74.07
Eastern New York.....	77.33	Upper Michigan.....	68.40
Western New York.....	78.40	Wisconsin.....	72.73
Eastern Pennsylvania.....	77.17	Minnesota.....	75.90
Western Pennsylvania.....	77.40	Iowa.....	74.90
New Jersey.....	79.77	Kansas.....	73.07
Delaware.....	78.57	Nebraska.....	72.03
Maryland.....	74.37	Missouri.....	79.77
District of Columbia.....	72.93	Colorado.....	67.43
Virginia.....	74.37	Eastern Dakota.....	68.20
North Carolina.....	76.87	Southern California*.....	86.16
South Carolina.....	83.27	Northern California*.....	83.27
Georgia.....	73.07	Oregon*.....	81.97
Eastern Florida.....	77.73	Washington Territory*.....	82.33
Western Florida.....	77.90	By elements:	
Alabama.....	78.67	Weather.....	81.25
Mississippi.....	80.87	Wind.....	76.90
Louisiana.....	82.47	Temperature.....	66.51
Texas.....	81.27		
Arkansas.....	80.07	General average.....	74.92
Tennessee.....	76.23		

\* In determining the general average percentage for the different elements, the Pacific coast states have not been included.

### CAUTIONARY SIGNALS.

Of the total number of cautionary and storm signals ordered during June, 1888, it was practicable to determine the justification or failure of eleven; justified, four, or 36.36 per cent. Of the above, ten were ordered for cautionary signals; number justified, four, or 40.00 per cent. One storm signal was ordered, and was not justified. Total number of direction signals ordered, eleven; justified, ten, or 90.90 per cent. Number of signals ordered for easterly winds, nine; all, or

100 per cent., of which were justified. Number of signals ordered for westerly winds, two; justified, one, or 50.00 per cent. Number of storms without signals, fifteen. Number of signals ordered late, *i. e.*, after the justifying velocity had begun, three, or 27.27 per cent.

### LOCAL VERIFICATIONS.

The following extracts from the published reports of the state weather services for June, 1888, show the percentages of verification of weather and temperature signals for the various states:

*Michigan.*—Weather signals are now displayed in one hundred and forty towns in the state, and upon the baggage-cars of twenty-six trains of eight of the principal railroads of the state.

The indications and cold-wave warnings are issued by the Chief Signal Officer and distributed to the different stations through the central office. The indications are issued at 1 a. m., daily, from the Chief Signal Office, Washington, and are for the twenty-four hours from 7 a. m. to 7 a. m.

The percentage of verification of these indications for June is as follows (the verification is taken from reports of displaymen furnished this office monthly): temperature, 82.2 per cent; weather, 81.5 per cent.; temperature and weather, 81.9 per cent.

Weather signals are displayed on the baggage cars of the following railroads: C. & G. T. R'y; D. G. H. & M. R'y; D. D. G. T. R'y; M. C., main line and branches; C. & W. M. R'y; G. R. & I. R'y; P. H. & N. W. R'y; and the P. O. & P. A. R'y.

The signals are carried on the first trains leaving terminal points in the morning, and the indications of the weather are for twenty-four hours from 7 a. m. of the day of display.

The signals on the trains are read from front to rear.

When two weather signals are displayed, as the white square followed by blue square, it indicates "fair weather followed by rain or snow."

The black triangle in front of the blue or white square indicates higher temperature. If last in the display it indicates lower temperature. If not displayed, stationary temperature is indicated.

*Minnesota.*—The verification of weather signals were: 77 per cent. for weather, and 86 per cent. for temperature.

*Nebraska.*—The percentages of correct weather predictions for the state were: temperature, 93.2; weather, 80.8; mean, 87.0.

*Ohio.*—The percentage of verification of weather signals received from the Signal Office in Washington, and distributed to forty display stations, was 80 for weather, and 84 for temperature. No cold wave signals were ordered during the month.

*South Carolina.*—The percentages of verifications of the weather and temperature predictions for the state were: weather, 68.0; temperature, 88.2.

*Tennessee.*—The percentages of verifications of weather and temperature predictions sent daily from the Signal Office at Washington to the various stations in the state were for the state: weather, 91.3 per cent.; temperature, 90.4 per cent.

## STATE WEATHER SERVICES.

The following extracts are republished from reports for June, 1888, of the directors of the various state weather services: